

REMARKS / ARGUMENTS

Assignment and Power of Attorney

As shown at Reel 018509, Frame 0615, this application has been assigned to Liebert Corporation. A Revocation of Power of Attorney with New Power of Attorney and Change of Correspondence Address is submitted herewith, along with a Statement Under 37 CFR 3.73(b).

Response to Office Action

For the convenience of the Examiner and clarity of purpose, Applicant has reprinted the substance of the Office Action in *10-point bolded and italicized font*. Applicant's arguments immediately follow in regular font.

1. Applicant's election without traverse of species I in the reply filed on 3/28/2006 is acknowledged.

Applicant confirms its election of Species I and that claim 35 has been withdrawn.

2. Claim 70 is objected to because it is unclear to the Examiner how the means for removing heat from the portion of air includes means for boiling a working fluid moving through a passage. The Examiner asserts that there are only two processes that can cause a fluid to boil, change the surrounding pressure, or increasing the temperature of the liquid. The Examiner respectfully asserts that neither the working fluid, nor the heat exchanger can provide the adequate means for boiling a working fluid. For the purposes of examination, the Examiner has considered the means for boiling a working fluid to be the piping in the heat exchanger.

For reasons unrelated to this objection, Applicant has canceled claim 70. Reconsideration and withdrawal of this objection is requested.

3. Claims 1-13, 16-19, 21-23, 25-26, 28-30, and 32 are rejected under 35 U.S.C. 102(b) as being anticipated by Khrustalev et al. (US 2003/001 0477).

With respect to claim 1, Khrustalev et al. teaches a computer system comprising: a chassis (10), a first computer module compartment (Between elements 30, See Fig 3. See also paragraph 35) positioned in the chassis and in an air flow path (See Paragraph 42, where the airflow path to cool 36 could be upward), a second computer module compartment (Between elements 30) positioned in the chassis and in the air flow path (See fig 1); and a heat exchanger (30) positioned in the chassis and in the air flow path (See fig 1).

Applicant respectfully traverses this rejection. Original claim 1 required, among other things, “a heat exchanger positioned in the chassis and in the air flow path.” The Office’s rejection of claim 1 over Khrustalev focused on the condenser 36 as the as the claimed “heat exchanger.” However, Applicant can find no disclosure or teaching in Khrustalev that there is an air flow path in cabinet 10 and that the condenser 36 is placed in such an air flow path. Indeed, Khrustalev discloses that the heat transfer out of the condenser 36 is accomplished by “external heat sink 12” to the ambient air *outside* of the cabinet 10. See [0042] and Fig. 1.

The Office appears to contend that Khrustalev [0042] discloses a heat-exchanging air flow within the cabinet 10. Applicant respectfully disagrees. First, there is no indication in any of the Khrustalev Figures of an air flow path or flow direction. Second, Applicant’s study of Khrustalev reveals that “air” is only mentioned in paragraph [0003] when describing prior art forced-air cooling systems. It must be noted that Khrustalev denigrates the use of forced-air cooling inside of cabinets in this paragraph. The only other occurrence of “air” is once and in paragraph [0042]. Third, paragraph [0042] is properly understood to disclose and teach that it is the “*external heat sink 12*” (and not the condenser 36) that may use a “conventional fin stack and cold plate that are adapted to utilize air flow for the transfer of heat.” Thus, Applicant submits that a person of ordinary skill in the art would *not* understand Khrustalev to disclose and

teach “a heat exchanger positioned in the chassis and in the air flow path” as required by original claim 1. Indeed, Khrustalev specifically distinguishes forced-air cooling inside a cabinet from his invention. Applicant respectfully submits that, for at least these reasons, Khrustalev cannot anticipate original claim 1. Reconsideration and withdrawal of this rejection is earnestly requested.

The patentability of claim 1 over Khrustalev notwithstanding, Applicant has chosen to amend claim 1 to more particularly and clearly point out what Applicant desires to protect with this claim. The amendments discussed hereafter were not made in response to the rejection of claim 1 over Khrustalev or in response to any patentability rejection.

Claim 1 has been amended to require, among other things, that heat from the first compartment is transferred to the air and that an air-to-fluid heat exchanger is positioned in the air flow path in the chassis between the first and second compartments and is adapted to remove a portion of the heat from the air. With respect to Khrustalev, in addition to not disclosing an air flow path in the cabinet 10, Khrustalev, does not disclose 1) an air-to-fluid heat exchanger within the cabinet 10; 2) transferring heat to air within the cabinet to effect cooling; or 3) that the condenser 36 is positioned between a first and second module compartment. Thus, for at least these reasons as well, claim 1 is patentable over Khrustalev.

With respect to claim 26, Khrustalev et al. further teaches a computer system comprising: a chassis (10), a first computer module compartment (Between respective heat exchangers (30) positioned in the chassis and in an air flow path (See Fig 1); a first heat exchanger (30) positioned in the chassis and in the air flow path (See Fig 1), wherein the first heat exchanger includes at least one internal fluid passage configured to carry a working fluid that absorbs heat from air flowing in the air flow path (See paragraph 39), and a second heat exchanger (30) in fluid communication with the first heat exchanger (See Fig 1, see also paragraph 37), wherein the second heat exchanger is

configured to cool the working fluid carried by the first heat exchanger (Upward airflow from either convection or forced air will cause transfer heat to the working fluid in the second, higher heat exchanger).

Applicant respectfully traverses this rejection. As argued above, Applicant does not agree with the Office that Khrustalev discloses an air path in the cabinet 10. Nothing in Figure 1 (or any Khrustalev Figure) discloses an air flow path, and the only written disclosure about air is the ambient air outside of the cabinet 10 (See [0042]). There is absolutely no disclosure in Khrustalev that the rail evaporators 30 absorb heat from “air flowing in the air flow path.” In contrast, Khrustalev discloses that the rail evaporators 30 absorb heat directly from contact with the horizontally oriented circuit boards 9 (See, e.g., [0036]). Applicant respectfully submits that Khrustalev cannot anticipate original claim 26 and reconsideration and withdrawal of this rejection is earnestly requested.

The patentability of claim 26 over Khrustalev notwithstanding, Applicant has chosen to amend claim 26 to more particularly and clearly point out what Applicant desires to protect with this claim. The amendments discussed hereafter were not made in response to the rejection of claim 26 over Khrustalev or in response to any patentability rejection.

Claim 26 has been amended to require, among other things, that the first heat exchanger is an air-to-fluid heat exchanger, and that the second heat exchanger is positioned external to the chassis. With respect to Khrustalev, in addition to not disclosing an air flow path in the cabinet 10, Khrustalev, does not disclose 1) an air-to-fluid heat exchanger within the cabinet 10; or 2) an external heat exchanger in fluid communication with the first heat exchanger. Thus, for at least these reasons as well, claim 26 is patentable over Khrustalev.

With respect to claim 2, Khrustalev et al. further teaches that the heat exchanger (30) is positioned at least partially downstream of the first computer module compartment and at least partially upstream of the second computer module compartment (See Fig 1).

With respect to claim 3, Khrustalev et al. further teaches that the heat exchanger (30) includes at least one internal fluid passage configured to carry a working fluid (See Paragraph 39).

With respect to claims 4 and 16, Khrustalev et al. further teaches that the heat exchanger (30) includes at least one internal fluid passage configured to carry a working fluid having a boiling point in the heat exchanger between about 45F and about 75F (See Paragraph 39. Additionally the Examiner notes that the language "configured to" or "adapted to" is not a positive limitation but only requires the ability to so perform, and therefore is given little patentable weight. In re Hutchison, 69 USPQ 138.)

Claims 2, 3 and 4 depend from independent claim 1. For at least the reasons discussed above with respect to claim 1, claims 2, 3 and 4 are likewise patentable over Khrustalev.

With respect to independent claim 16, applicant contends that it is not anticipated by Khrustalev for at least the reasons discussed above with respect to original claim 1 and reconsideration and withdrawal of this rejection is earnestly requested.

The patentability of claim 16 over Khrustalev notwithstanding, Applicant has chosen to amend claim 16 to more particularly and clearly point out what Applicant desires to protect with this claim. The amendments discussed hereafter were not made in response to the rejection of claim 16 over Khrustalev or in response to any patentability rejection.

Claim 16 has been amended to require, among other things, that heat from the first compartment is transferred to the air and that an air-to-fluid heat exchanger is positioned in the air flow path after the first and is adapted to remove a portion of the heat from the air. With respect to Khrustalev, in addition to not disclosing an air flow path in the cabinet 10, Khrustalev, does not disclose 1) an air-to-fluid heat exchanger within the cabinet 10; 2) transferring heat to

air within the cabinet to effect cooling; or 3) that the condenser 36 is positioned between a first and second module compartment. Thus, for at least these reasons as well, claim 16 is patentable over Khrustalev.

With respect to claim 5, Khrustalev et al. further teaches that the heat exchanger (30) includes at least one opening through which air can pass from at least proximate the first computer module compartment to at least proximate the second computer module compartment (See Fig 2).

With respect to claims 6 and 29, Khrustalev et al. further teaches that the heat exchanger (30) is positioned at least partially between the first and second computer module compartments in the chassis (See Figs 1 and 3, see also paragraph 35).

With respect to claims 7, 8, and 9, Khrustalev et al. further teaches that the heat exchanger (30) is a first heat exchanger, and wherein the computer system further comprises: a third computer module compartment (Between two of the heat exchangers (30) see Fig 1) positioned in the chassis and in the air flow path (See Fig 1); and a second heat exchanger (30, see paragraph 36) positioned in the chassis and in the air flow path (See Fig 1), wherein the second heat exchanger is positioned at least partially downstream of the second computer module compartment and at least partially upstream of the third computer module compartment (See Fig 1), wherein the first, second and third computer module compartments, and the first and second heat exchangers, are arranged vertically in the chassis (See Fig 1).

With respect to claims 10, 11, and 17, Khrustalev et al. further teaches that the first computer module compartment (Between respective heat exchangers (30)) is configured to hold at least a first computer module (or a plurality thereof) oriented edgewise with respect to the air flow path (See Fig 1).

With respect to claim 12, Khrustalev et al. further teaches that the first computer module compartment is configured to hold at least a first computer module oriented edgewise with respect to the air flow path toward a first side of the heat exchanger (See Fig 1), and wherein the second computer module compartment is configured to hold at least a second computer module oriented edgewise with respect to the air flow path toward a second side of the heat exchanger opposite to the first side of the heat exchanger (See Fig 1).

With respect to claim 13, Khrustalev et al. further teaches a first computer module (9) carried by the first computer module compartment (See Fig 3), wherein the first computer module includes at least a first computer processor (7, see paragraph 2, "IC"), and a second computer module (9) carried by the second computer module compartment, wherein the second computer module

includes at least a second computer processor (7, see paragraph 36).

With respect to claim 18, Khrustalev et al. further teaches that the first computer module compartment is position at least proximate to a first side of the heat exchanger (See Fig 1), and wherein the chassis further includes a second computer module compartment (Between a second set of 30) positioned in the air flow path in the chassis at least proximate to a second side of the heat exchanger opposite to the first side of the heat exchanger (See Fig 1).

With respect to claim 19, Khrustalev et al. further teaches that the heat exchanger (30) is a first heat exchanger, and wherein the computer system further comprises: a third computer module compartment positioned in the air flow path (See Fig 1) in the chassis (10), and a second heat exchanger (30) positioned at least partially between the second and third computer module compartments (See Fig 1) in the air flow path in the chassis, the second heat exchanger including at least one internal fluid passage configured to carry a working fluid having a boiling point in the second heat exchanger between about 45F and about 75F (See paragraph 39).

With respect to claims 21 and 22, Khrustalev et al. further teaches that the working fluid is carried by the internal fluid passage of the heat exchanger (See Paragraph 39) and wherein a first portion of the working fluid is in a liquid state and a second portion of the working fluid is in a gaseous state in the heat exchanger (The working fluid will be both in a liquid and gaseous state in the heat exchanger since the heat from the board (9) is causing the fluid to change phases).

With respect to claim 23, Khrustalev et al. further teaches that the working fluid is a refrigerant (Paragraph 39, "Freon").

With respect to claim 25, Khrustalev et at. further teaches that the heat exchanger (30)is positioned upstream of the first computer module compartment in the chassis (See Fig 1).

With respect to claim 28, Khrustalev et al. further teaches a plurality of computer modules (7) held in the first computer module compartment (See Fig 3).

With respect to claim 30, Khrustalev et at. further teaches that the second heat exchanger (30)is spaced apart from the chassis (See Fig 1).

With respect to claim 32, Khrustalev et at. further teaches that the first computer module compartment is configured to hold a plurality of computer modules (7) oriented edgewise with respect to the air flow path (See Fig 3).

Claims 5 – 13 depend from independent claim 1. For at least the reasons discussed above with respect to claim 1, claims 5 – 13 are likewise patentable over Khrustalev. Reconsideration and withdrawal of these rejections is earnestly requested. None of claims 5 – 13 have been

amended in response to these rejections.

Claims 17 – 23 and 25 depend from independent claim 16. For at least the reasons discussed above with respect to claim 16 claims 17 – 23 and 25 are likewise patentable over Khrustalev. Reconsideration and withdrawal of these rejections is earnestly requested. None of claims 17 – 23 and 25 have been amended in response to these rejections.

Claims 28 – 30 and 32 depend from independent claim 26. For at least the reasons discussed above with respect to claim 26, claims 28 - 30 and 32 are likewise patentable over Khrustalev. Reconsideration and withdrawal of these rejections is earnestly requested. None of claims 28 - 30 and 32 have been amended in response to these rejections.

4. Claims 14, 15, 20, 33-34, 36-49, 51, 53, 54-57, 59-71 are rejected under 35 U.S.C. 103(a) as being unpatentable over Khrustalev et al. in view of Benavides (US 6,185,098).

With respect to claims 14, 15, 20, Khrustalev et al. teaches the limitations of claim 1 above, and further teaches airflow, but is silent as to utilizing an air mover carried by the chassis and configured to move air past the heat exchanger along the air flow path in the chassis. Benavides teaches an air mover (203/208) carried by a chassis (101) and configured to move air past the heat exchanger along an air flow path in a chassis. It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Benavides with that of Khrustalev et al. to provide additional ventilation (Benavides: Column 12, Lines 59-61).

Applicant respectfully traverses this rejection. First, as argued above, Khrustalev cannot anticipate independent claims 1 or 16. Second, Benavides discloses a server cabinet having two or more securable compartments. Benavides does not disclose or teach using heat exchangers in the cabinets positioned in an air flow path. As far as heat removal, Benavides merely discloses top-mounted or rear-mounted fans to evacuate heated air from the cabinet. Thus, in addition to not disclosing heat exchangers in a dedicated air flow path, Benavides does not even disclose or

teach if the air movement with the cabinet is through the servers, around the servers or some other path.

Applicant contends that is improper to combine the disclosures of Khrustalev and Benavides at least because Khrustalev teaches a heat exchange system that specifically does not utilize an air flow path within the cabinet. The Office has pointed to no teaching, suggestion or motivation to combine the forced-air, non-cooling system of Benavides with the physical contact system of Khrustalev. However, even if such combination were allowed by controlling precedent, the resulting combination would not disclose each claim limitation of claims 14, 15 and 20.

For at least these reasons, Applicant contends that claims 14, 15 and 20 are patentable over Khrustalev, Benavides and their combination. No amendments to claims 14, 15 or 20 were made in response to these rejections. Reconsideration and withdrawal is requested.

With respect to claim 33, Khrustalev et al. further teaches a computer system comprising, a chassis (10), a flow path through at least a portion of the chassis, a first computer module compartment (Between respective heat exchangers (30)) positioned in an air flow path in the chassis, a first plurality of computer modules (7) held in the first computer module compartment; a second computer module compartment (Between respective heat exchangers 30) positioned in an air flow path in the chassis and spaced apart from the first computer module compartment (See Fig 1, see also Paragraphs 35-37), a second plurality of computer modules (7) held in the second computer module compartment at least partially in the air flow path; and a heat exchanger (30) positioned in the air flow path in the chassis (See Fig 1), wherein the heat exchanger is positioned at least partially downstream of the first computer module compartment and at least partially upstream of the second computer module compartment (See Fig 1), and wherein the heat exchanger includes at least one opening through which the air mover moves air (See Fig 2 adjacent the arrows of the element number 31). Khrustalev et al. is silent as to an air mover positioned in flow communication with the chassis, wherein the air mover is configured to move air along a flow path. Benavides teaches an air mover (203/208) configured to move air past the heat exchanger along an air flow path in a chassis. It would have been obvious to one of ordinary skill in

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the art at the time the invention was made to combine the teachings of Benavides with that of Khrustalev et al. to provide additional ventilation (Benavides: Column 12, Lines 59-61).

Applicant respectfully traverses this rejection. First, for at least the reasons argued above with respect to claims, 1, 16 and 26, Khrustalev cannot anticipate independent claim 33. Second, for at least the reasons presented above for claims 14, 15 and 20, it is improper to combine Khrustalev and Benavides, and even if such combination were allowed by controlling precedent, the resulting combination would not disclose each claim limitation of original claim 33.

For at least these reasons, Applicant contends that claim 33 is patentable over Khrustalev, Benavides and their combination. No amendment to claim 33 was made in response to this rejection. Reconsideration and withdrawal is requested.

The patentability of claim 33 over Khrustalev and Benavides notwithstanding, Applicant has chosen to amend claim 33 to more particularly and clearly point out what Applicant desires to protect with this claim. The amendments discussed hereafter were not made in response to the rejection of claim 33 over Khrustalev and Benavides or in response to any patentability rejection.

Claim 33 has been amended to require, among other things, that heat exchanger is an air-to-fluid heat exchanger and the air flowing through the heat exchanger opening transfers heat to the heat exchanger. With respect to Khrustalev, in addition to not disclosing an air flow path in the cabinet 10, Khrustalev, does not disclose 1) an air-to-fluid heat exchanger within the cabinet 10; or 2) transferring heat to the heat exchanger within the cabinet to effect cooling. Thus, for at least these reasons as well, claim 33 is patentable over Khrustalev and Benavides.

With respect to claim 34, Benavides further teaches that the air mover (203/208) is positioned toward an upper portion of the chassis and configured to draw air upward through the chassis such that air would draw past the first computer module compartment, the heat exchanger, and the second computer module compartment of Khrustalev et al.

With respect to claim 36, Benavides further teaches that the air mover is carried by the chassis (See Fig 2).

With respect to claim 37, Khrustalev et al. further teaches that the heat exchanger is a first heat exchanger, and wherein the computer system further comprises: a third computer module compartment (See Fig 1, see also Paragraph 36) positioned in the air flow path in the chassis and spaced apart from the second computer module compartment; a third plurality of computer modules (7) held in the third computer module compartment (See Paragraph 36) at least partially in the air flow path; and a second heat exchanger (30) positioned in the air flow path in the chassis, wherein the second heat exchanger is positioned at least partially downstream of the second computer module compartment and at least partially upstream of the third computer module compartment (See Fig 1), and wherein the heat exchanger includes at least one opening through which the air mover moves air (See Fig 2).

With respect to claim 38, Khrustalev et al. further teaches that the first computer module compartment, the second computer module compartment, and the heat exchanger are arranged vertically with respect to the chassis (See Figs 1 and 2).

With respect to claim 39, Khrustalev et al. further teaches that the first computer module compartment is configured to hold at least a first computer module oriented edgewise with respect to the air flow path toward a first side of the heat exchanger (See Fig 1), and wherein the second computer module compartment is configured to hold at least a second computer module oriented edgewise with respect to the air flow path toward a second side of the heat exchanger opposite to the first side of the heat exchanger (See Fig 1).

With respect to claim 40, Khrustalev et al. further teaches that the first plurality of computer modules (7) is individually carried by the first computer module compartment (As illustrated in Fig 3 for example), wherein each of the first plurality of computer modules includes at least a first computer processor (See Paragraph 2, "IC"), wherein each of the second plurality of computer modules (7) is individually carried by the second computer module compartment (Again as illustrated in Fig 3 for example), and wherein each of the second plurality of computer modules includes at least a second computer processor (See paragraph 2, "IC").

With respect to claim 41, Khrustalev et al. further teaches that the heat exchanger (30) includes at least one internal fluid passage configured to carry a working fluid (See Paragraph 39).

With respect to claim 42, Khrustalev et al. further teaches that the heat exchanger (30) includes at least one internal fluid passage configured to carry

a working fluid having a boiling point in the heat exchanger between about 45F and about 75F (See Paragraph 39. Additionally the Examiner notes that the language “configured to” or “adapted to” is not a positive limitation but only requires the ability to so perform, and therefore is given little patentable weight. In re Hutchison, 69 USPQ 138.)

With respect to claim 43, Khrustalev et al. further teaches that each computer module (7) of the first and second pluralities of computer modules includes at least one processor (See paragraph 2, “IC”).

Claims 34 and 36 - 43 depend from independent claim 33. For at least the reasons discussed above with respect to claim 33, claims 34 and 36 - 43 are likewise patentable over Khrustalev in view of Benavides. Reconsideration and withdrawal of these rejections is earnestly requested. None of claims 34 and 36 - 43 has been amended in response to these rejections.

With respect to method claims 44-49, 51, 54 the method steps recited in the claims are inherently necessitated by the device structure as taught by the Khrustalev et al. and Benavides references.

Applicant respectfully traverses these rejections. As discussed above, Khrustalev does not teach or disclose the structure for or the benefits of forcing air through the interior of a cabinet to pick up heat from computer modules and then directing that heated air through an air-to-fluid heat exchanger to cool the air. Khrustalev's invention specifically does not rely on forced air movement within the cabinet. With respect to the combination of Khrustalev and Benavides, Applicant challenges the propriety of such combination as set forth above. However, even if such combination were appropriate, the resulting combined structure would not have all of the recited limitations set forth in independent claims 44 or 51. For at least these reasons, Applicant contends that claims 44 and 51 are patentable over Khrustalev, Benavides and their combination. No amendment to claims 44 or 51 was made in response to this rejection.

Reconsideration and withdrawal is requested.

The patentability of claims 44 and 51 over Khrustalev and Benavides notwithstanding, Applicant has chosen to amend claims 44 and 51 to more particularly and clearly point out what Applicant desires to protect with these claims. The amendments discussed hereafter were not made in response to the rejection of claim 44 or 51 over Khrustalev and Benavides or in response to any patentability rejection.

Claims 44 and 51 have been amended to require, among other things, that heat exchanger is an air-to-fluid heat exchanger and the air flows through the heat exchanger. Thus, for at least these reasons as well, claims 44 and 51 are patentable over Khrustalev and Benavides.

With respect to method claim 53, Khrustalev et al. in view of Benavides teaches the limitations of claim 51 above but is silent as to the working fluid has a boiling point between about 50F and about 65F, however it would have been obvious to one of ordinary skill in the art at the time the invention was made to setup the system such that the refrigerant has a boiling point in the heat exchanger between about 50F and 65F since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). In the present case having a boiling point between 50F and 65F will provide a suitable degree of cooling to the components therewith.

With respect to method claim 55, Khrustalev et al. in view of Benavides teaches the limitations of claim 51 above and further teaches that the working fluid is a first working fluid, and the heat exchanger (30) is a first heat exchanger having a first internal passage (30, 31, 44), and wherein the method further comprises: after moving the portion of air past the first heat exchanger (30), moving the portion of air past a second computer module (7) in the chassis to transfer heat from the second computer module (7) to the portion of air; moving a second working fluid (See Paragraph 39) through a second internal passage (30, 31, 44) of a second heat exchanger (30) positioned at least proximate to the second computer module (7) in the chassis (See paragraph 37), and moving the portion of air past the second heat exchanger (30) to transfer heat from the portion of air to the second heat exchanger (30) and boil at least a portion of the second working fluid in the second internal passage (See paragraphs 39-40).

With respect to claim 56, Khrustalev et al. in view of Benavides teaches the limitations of claim 55 above and further teaches moving the first working

fluid through the first internal passage (30, 31, 44) includes moving a first portion of a refrigerant received from a refrigerant source (36), and wherein moving a second working fluid through a second internal passage (30, 31, 44) includes moving a second portion of the refrigerant. Khrustalev et al. in view of Benavides is silent as to the second working fluid being received from the refrigerant source, however It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the system of Khrustalev et al. such that all of the sets of passages have a common refrigerant source since doing so would allow flexibility in the system such that if the system as a whole requires more working fluid (refrigerant, I.E. because more of the heat exchangers are being used) the system could draw from common refrigerant source.

Claims 53 and 55 - 56 depend from independent claim 51. For at least the reasons discussed above with respect to claim 51, claims 53 and 55 - 56 are likewise patentable over Khrustalev in view of Benavides. Reconsideration and withdrawal of these rejections is earnestly requested. None of claims 53 and 55 - 56 has been amended in response to these rejections.

With respect to claim 57, Khrustalev et al. teaches a method for dissipating heat generated by a computer module (7) in a chassis (10), the method comprising: moving a working fluid (See Paragraph 39) through an internal passage (30, 31, 44) of a heat exchanger (30) positioned in the chassis (10), moving a portion of air past the heat exchanger (30) to transfer heat from the portion of air to the working fluid, and controlling the working fluid (Via piping 30, 31, 44, and wick 64) to maintain the working fluid at least proximate to the phase transition state while flowing through the internal passage (See paragraphs 39-40). Khrustalev et al. is silent as to moving a portion of air past the computer module in the chassis to transfer heat from the computer module to the portion of air. Benavides teaches moving a portion of air past a computer module in a chassis to transfer heat from the computer module to the portion of air (Via 207, 208, see Fig 2). It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Benavides with that of Khrustalev et al. to provide additional ventilation (Benavides: Column 12, Lines 59-61).

Applicant respectfully traverses these rejections. As discussed above, Khrustalev does not teach or disclose the structure for or the benefits of forcing air through the interior of a cabinet to pick up heat from computer modules and then directing that heated air through an air-

to-fluid heat exchanger to cool the air. Khrustalev's invention specifically does not rely on forced air movement within the cabinet.

With respect to the combination of Khrustalev and Benavides, Applicant challenges the propriety of such combination as set forth above. However, even if such combination were appropriate, the resulting combined structure would not have all of the recited limitations set forth in independent claim 57. For at least these reasons, Applicant contends that claim 57 is patentable over Khrustalev, Benavides and their combination. No amendment to claim 57 was made in response to this rejection. Reconsideration and withdrawal is requested.

The patentability of claim 57 over Khrustalev and Benavides notwithstanding, Applicant has chosen to amend claim 57 to more particularly and clearly point out what Applicant desires to protect with these claims. The amendments discussed hereafter were not made in response to the rejection of claim 57 over Khrustalev and Benavides or in response to any patentability rejection.

Claim 57 has been amended to require, among other things, that heat exchanger is an air-to-fluid heat exchanger and the air flows through the heat exchanger. Thus, for at least these reasons as well, claim 57 is patentable over Khrustalev and Benavides.

With respect to claim 59, Khrustalev et al. in view of Benavides teaches the limitations of claim 57 but is silent as to the working fluid, wherein the working fluid is a refrigerant having a boiling point in the heat exchanger between about 50F and about 65F, however it would have been obvious to one of ordinary skill in the art at the time the invention was made to setup the system such that the refrigerant has a boiling point in the heat exchanger between about 50F and 65F since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). In the present case having a boiling point between 50F and 65F will provide a suitable degree of cooling to the components therewith.

With respect to claim 60, Khrustalev et al. further teaches that the computer module (7) is a first computer module, and wherein the method further comprises, after moving the portion of air past the heat exchanger (30), moving the portion of air past a second computer module (7) in the chassis (10) to transfer heat from the second computer module (7) to the portion of air (That is, as air blows upward in the chassis of Khrustalev, it will pickup heat from the first lower module (7) and blow past the second higher heat exchanger (30) which supports a second computer module (7) and will further blow air past the second module).

With respect to claim 61, Khrustalev et al. further teaches that controlling the working fluid to maintain the working fluid at least proximate to the phase transition state includes controlling the pressure of the working fluid (The sizing of the pipes controls the pressure of the working fluid within).

Claims 59 - 61 depend from independent claim 57. For at least the reasons discussed above with respect to claim 57, claims 59 - 61 are likewise patentable over Khrustalev in view of Benavides. Reconsideration and withdrawal of these rejections is earnestly requested. None of claims 59 - 61 have been amended in response to these rejections.

With respect to claim 62, Khrustalev et al. further teaches a system for cooling first and second computer modules (7) positioned in a chassis (10, See Fig 3), the system comprising: means (openings in 30) for moving the portion of air past a heat exchanger (30) in the chassis (10) after moving the portion of air past the first computer module (7), and means (See present office action Fig 1 below) for moving the portion of air past the second computer (7) module in the chassis after moving the portion of air past the heat exchanger (30). Khrustalev et al. is silent as to a means for moving a portion of air past the first computer module in the chassis to transfer heat from the first computer module to the portion of air. Benavides teaches a means (203/208) for moving a portion of air past a first computer module in a chassis to transfer heat from the first computer module to the portion of air. It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Benavides with that of Khrustalev et al. to provide additional ventilation (Benavides: Figure 1

With respect to claim 63, Khrustalev et al. further teaches that the heat exchanger (30) is a first heat exchanger, and further comprising: means (opening in 30) for moving the portion of air past a second heat exchanger (30) in the chassis after moving the portion of air past the second computer module (7); and means (See POA fig 1 above) for moving the portion of air past a third computer module (7) in the chassis after moving the portion of air past the second heat exchanger (30) Since the system is redundant as described in paragraph 37, the air will flow past the second heat exchanger (30) which

has openings and then past a second module (7) similar to the first module which also has openings).

With respect to claim 64, Khrustalev et al. further teaches that the means (opening in 30) for moving the portion of air past a heat exchanger includes means for moving the portion of air through an opening in the heat exchanger.

With respect to claim 65, Khrustalev et al. further teaches means (64) for moving a working fluid through an internal passage in the heat exchanger (See Paragraph 39).

With respect to claim 66, Khrustalev et al. further teaches means (30, 31, 44, etc.) for moving a working fluid (See paragraph 39) having a boiling point between about 45F and about 75F through an internal passage in the heat exchanger.

With respect to claim 67, Khrustalev et al. further teaches a computer system comprising: means (30) for positioning at least a first computer module (7) in a first position along an air flow path; means (30) for positioning at least a second computer module (7) in a second position along the air flow path; and means (30, 31, 44, 64, and working fluid) for removing heat from the portion of air, wherein the means for removing heat are positioned at least partially between the first computer module (7) and the second computer module along the air flow path (See paragraph 37 and Figs 1-3). Khrustalev et al. is silent as to a means for moving a portion of air along the air flow path. Benavides teaches a means (203/208) for moving a portion of air along an air flow path. It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Benavides with that of Khrustalev et al. to provide additional ventilation (Benavides: Column 12, Lines 59-61).

With respect to claim 68, Khrustalev et al. further teaches that the means (30) for positioning at least a first computer module (7) includes means for positioning a first plurality of computer modules (7) at least proximate to the air flow path (See Fig 3), and wherein the means (30) for positioning at least a second computer module includes means for positioning a second plurality of computer modules (7) at least proximate to the air flow path (See Paragraph 37, and Figs 1-3).

With respect to claim 69, Khrustalev et al. further teaches that the means (30, 31, 44, 64, and working fluid) for removing heat from the portion of air includes means (64) for moving a working fluid through a passage (30, 31, 44) positioned at least proximate to the air flow path (See Figs 1-3).

With respect to claim 70, as best can be understood by the examiner, Khrustalev et al. further teaches that the means (30, 31, 44, 64, and working fluid) for removing heat from the portion of air includes means (30, 31, 44) for boiling a working fluid moving through a passage positioned at least proximate to the air flow path.

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With respect to claim 71, Khrustalev et al. further teaches that the means (30, 31, 44, 64, and working fluid) for removing heat from the portion of air includes means (64) for moving a working fluid through a passage positioned at least proximate to the air flow path, wherein a first portion of the working fluid is in a liquid state and a second portion of the working fluid is in a gaseous state (The working fluid will be both in a liquid and gaseous state in the heat exchanger since the heat from the board (9) is causing the fluid to change phases).

Applicant respectfully traverses these rejections. For at least the reasons discussed above, Applicant contends that claims 62 - 71 are patentable over Khrustalev, Benavides and their combination. No amendment to claims 62 - 71 were made in response to this rejection. Reconsideration and withdrawal is requested.

The patentability of claims 62 - 71 over Khrustalev and Benavides notwithstanding, Applicant has chosen to cancel claims 62 - 71 from this application.

5. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Khrustalev et al.

With respect to claim 24, Khrustalev et al. teaches the limitations of claim 16 but is silent as to the working fluid, wherein the working fluid is a refrigerant having a boiling point in the heat exchanger between about 50F and about 65F, however it would have been obvious to one of ordinary skill in the art at the time the invention was made to setup the system such that the refrigerant has a boiling point in the heat exchanger between about 50F and 65F since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). In the present case having a boiling point between 50F and 65F will provide a suitable degree of cooling to the components therewith.

Claim 24 depends from independent claim 16. For at least the reasons discussed above with respect to claim 16, claim 24 is likewise patentable over Khrustalev. Reconsideration and withdrawal of these rejections is earnestly requested. Claim 24 has not been amended in response to this rejection.

6. Claims 27 and 58 are rejected under 35 U.S.C. 103(a) as being unpatentable over Khrustalev et al. in view of Salt (US 5,603,375).

With respect to claim 27, Khrustalev et al. teaches the limitations of claim 26 above but is silent as to the working fluid has a boiling point in the first heat exchanger between about 45F and about 75F. Salt teaches utilizing a working fluid which has a boiling point in a heat exchanger of between about 45F and 75F (Column 2, Lines 1-5). It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Salt with that of Khrustalev et al. to provide adequate heat transfer capabilities.

Applicant respectfully traverses these rejections. As discussed above, Khrustalev does not teach or disclose the structure for or the benefits of forcing air through the interior of a cabinet to pick up heat from computer modules and then directing that heated air through an air-to-fluid heat exchanger to cool the air. Khrustalev's invention specifically does not rely on forced air movement within the cabinet.

With respect to the combination of Khrustalev and Salt, Applicant challenges the propriety of such combination. However, even if such combination were appropriate, the resulting combined structure would not have all of the recited limitations set forth in independent claim 27. For at least these reasons, Applicant contends that claim 27 is patentable over Khrustalev, Salt and their combination. No amendment to claim 27 was made in response to this rejection. Reconsideration and withdrawal is requested.

With respect to claim 58, Khrustalev et al. in view of Benavides teaches the limitations of claim 57 above but is silent as to the working fluid has a boiling point in the first heat exchanger between about 45F and about 75F. Salt teaches utilizing a working fluid which has a boiling point in a heat exchanger of between about 45F and 75F (Column 2, Lines 1-5). It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Salt with that of Khrustalev et al. and Benavides to provide adequate heat transfer capabilities.

Applicant respectfully traverses these rejections. As discussed above, Khrustalev does not teach or disclose the structure for or the benefits of forcing air through the interior of a cabinet to pick up heat from computer modules and then directing that heated air through an air-to-fluid heat exchanger to cool the air. Khrustalev's invention specifically does not rely on forced air movement within the cabinet.

With respect to the combination of Khrustalev, Benavides and Salt, Applicant challenges the propriety of such triple combination and requests that the Office either withdraw this rejection or specifically and explicitly state the motivation or suggest in the art that authorizes such combination. However, even if such combination were appropriate, the resulting combined structure would not have all of the recited limitations set forth in independent claim 58. For at least these reasons, Applicant contends that claim 58 is patentable over Khrustalev, Benavides, Salt and their combination. No amendment to claim 58 was made in response to this rejection. Reconsideration and withdrawal is requested.

7. Claims 50 and 52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Khrustalev et al. in view of Benavides and further in view of Salt.

With respect to method claims 50, 52 Khrustalev et al. in view of Benavides teach the method of claim 44 above, and further teaches moving the portion of air past the heat exchanger includes transferring heat to the working fluid but fails to teach the working fluid having a boiling point between about 45F and about 75F. Salt teaches utilizing a working fluid which has a boiling point in a heat exchanger of between about 45F and 75F (Column 2, Lines 1-5). It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Salt with that of Khrustalev et al. to provide adequate heat transfer capabilities.

Applicant respectfully traverses these rejections. As discussed above, Khrustalev does

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not teach or disclose the structure for or the benefits of forcing air through the interior of a cabinet to pick up heat from computer modules and then directing that heated air through an air-to-fluid heat exchanger to cool the air. Khrustalev's invention specifically does not rely on forced air movement within the cabinet.

With respect to the combination of Khrustalev, Benavides and Salt, Applicant challenges the propriety of such triple combination and requests that the Office either withdraw this rejection or specifically and explicitly state the motivation or suggest in the art that authorizes such combination. However, even if such combination were appropriate, the resulting combined structure would not have all of the recited limitations set forth in claims 50 or 52. For at least these reasons, Applicant contends that claims 50 and 52 are patentable over Khrustalev, Benavides, Salt and their combination. No amendment to claims 50 or 52 was made in response to this rejection. Reconsideration and withdrawal is requested.

8. Claim 31 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

With respect to claim 31, the allowability resides in the overall structure of the device as recited in dependent claim 31 and at least in part because claim 31 recites, "a controller operably coupled to the second heat exchanger to maintain the working fluid in phase transition within the first heat exchanger".

The aforementioned limitations in combination with all remaining limitations of claims 26 and 31 are believed to render said claim 31 patentable over the art of record.

Applicant thanks the Examiner for his efforts on this file and the favorable consideration

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given to claim 31. However, at this time, Applicant chooses not to re-present claim 31 in favor of the arguments presented above.

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

US 2006/0102322 teaches multiple heat exchangers in a chassis.

Applicant would note that the current application and the cited application are now commonly owned by Liebert Corporation.

Other Amendments

For reasons unrelated to any amendments made above in direct relation to a claim rejection, Applicant has chosen to make the following amendments to more particularly point and distinctly claim certain aspects of the disclosed inventions. These amendments may or may not be narrowing in scope and are not being made for patentability reasons. Applicant has amended claims 45 – 50, 54, 55 and 60.

CONCLUSION

Claims 1 – 34 and 36 were pending prior to this response with claims 1 – 30, 32 – 34 and 36 – 71 being rejected, claim 31 being objected to, and claim 35 being withdrawn.

Claims 1, 16, 26, 33, 44 – 51, 54, 55, 57 and 60 have been amended herein and claims 62 – 71 have been canceled. Applicant submits that each claim presented herein is patentable. A timely notice of allowance is respectfully requested.

Applicant thanks the Examiner for his consideration and effort on this file. If there are

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any questions or if additional information is needed, the Examiner is invited to telephone or email the undersigned.

Respectfully submitted,

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